

Complete feature set for image  $x$       Comparison rule for category  $c_i$   
(i.e. feature combination describing category  $c_i$ )

From the complete set of features for the image  $x$ ,  
take only the features required by the comparison  
rule for the category  $c_i$ . ~A

Compute the similarity metric,  $\text{sim}(x, c_i)$ , between  
the image  $x$  and category  $c_i$  as:

$$\text{sim}(x, c_i) = \frac{1}{N_i} \prod_{j=1}^{M_i} \tau(\text{RF}_j(x | c_i), \text{RF}_j(c_i)) \cdot \sum_{j=1}^{N_i} \tau(\text{FO}_j(x | c_i), \text{FO}_j(c_i))$$

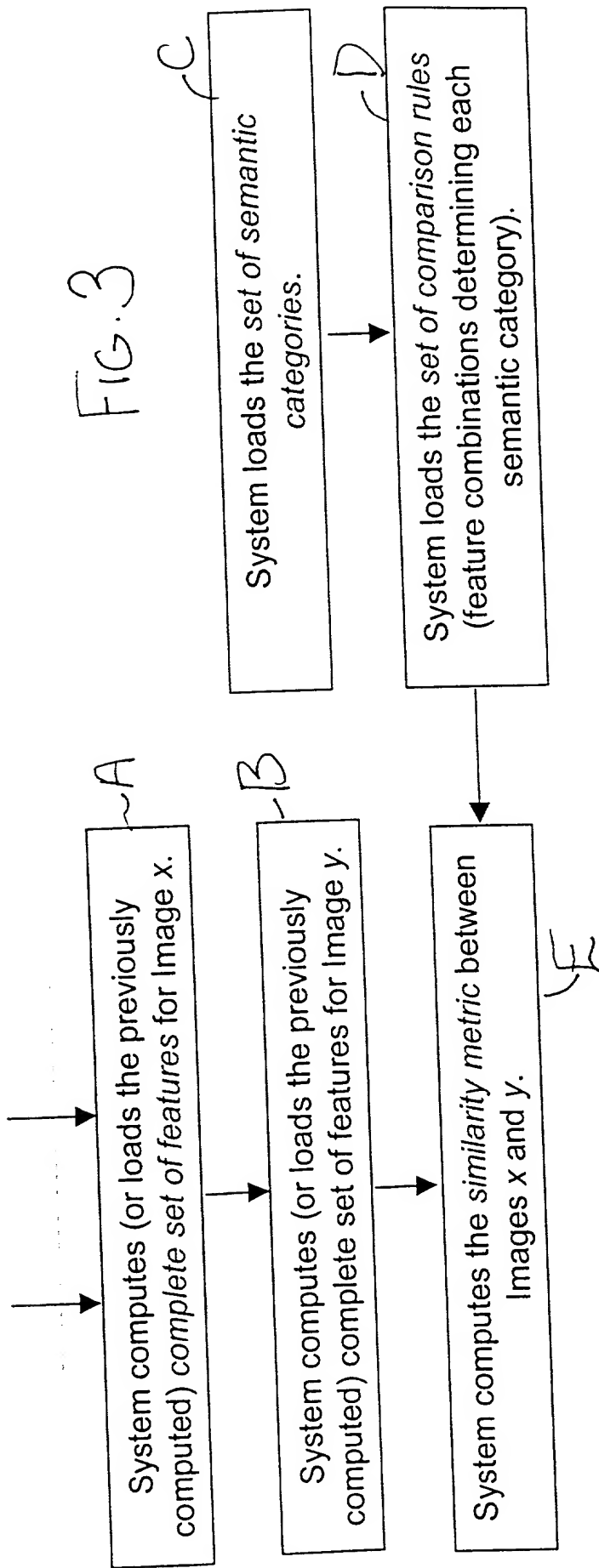
$$\tau(a, B) = \begin{cases} 1, & (\exists i) a = b_i \\ 0, & (\forall i) a \neq b_i \end{cases} \text{ and } B = \{b_i\}_{i=1, \dots, I}$$

where: RF are  $M_i$  required features, and FO are  $N_i$   
frequently occurring features for the category  $c_i$ . ~B

$\text{sim}(x, c_i)$

FIG. 2

Image x      Image y



Complete feature set for image x

Complete feature set for image y

Determine the semantic category for image x.

Determine the semantic category for image y.

Compute the similarity metric  $\text{sim}(x, y)$  between the images x and y as:

$$\text{sim}(x, y) = [\text{sim}(x, y | cx) + \text{sim}(x, y | cy)] / 2$$

where:

$$\text{sim}(x, y | cx) = \frac{\prod_{j=1}^{M_i} (1 + \tau(RF_j(x | cx), RF_j(y | cx))) \cdot \prod_{j=1}^{N_i} (1 + \tau(FO_j(x | cx), FO_j(y | cx)))}{2^{M_x + N_x}}$$

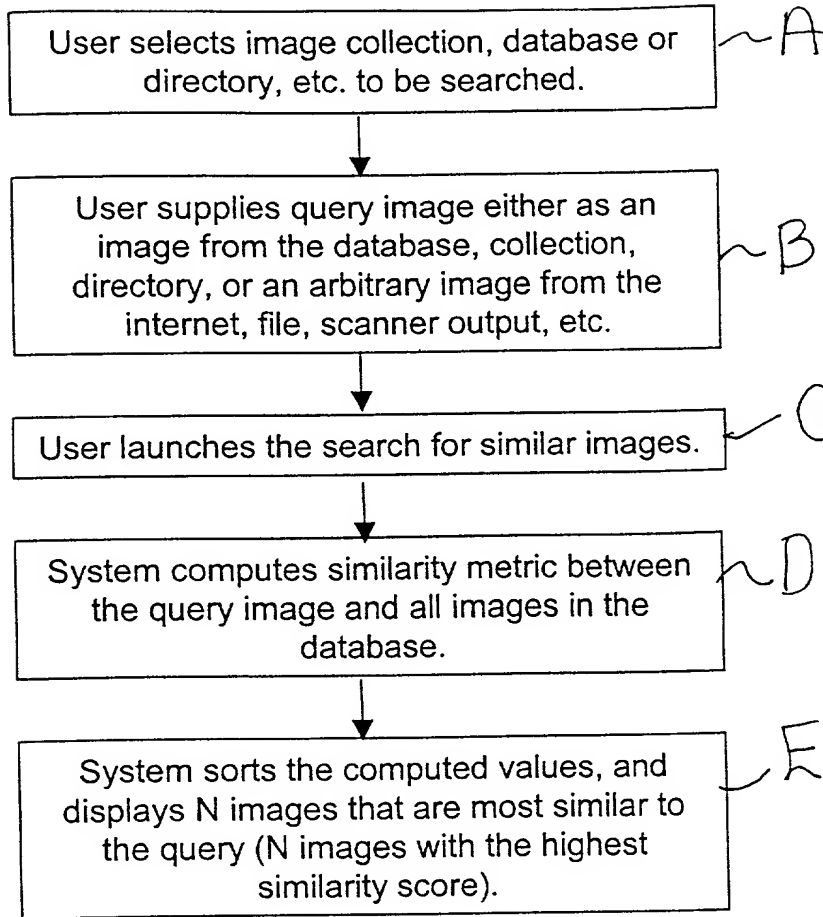
$$\text{sim}(x, y | cy) = \frac{\prod_{j=1}^{M_i} (1 + \tau(RF_j(x | cy), RF_j(y | cy))) \cdot \prod_{j=1}^{N_i} (1 + \tau(FO_j(x | cy), FO_j(y | cy)))}{2^{M_y + N_y}}$$

$$\tau(a, B) = \begin{cases} 1, & (\exists i) a = b_i \\ 0, & (\forall i) a \neq b_i \end{cases} \text{ and } B = \{b_i\}_{i=1, \dots, I}$$

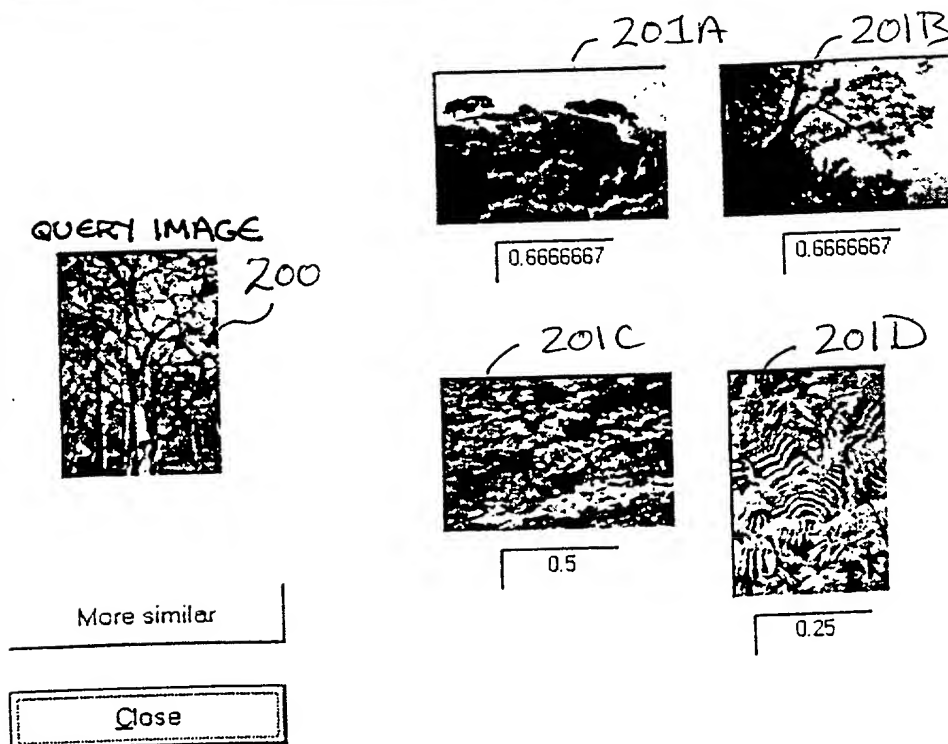
$\text{sim}(x, y)$

FIG. 4

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Similar images



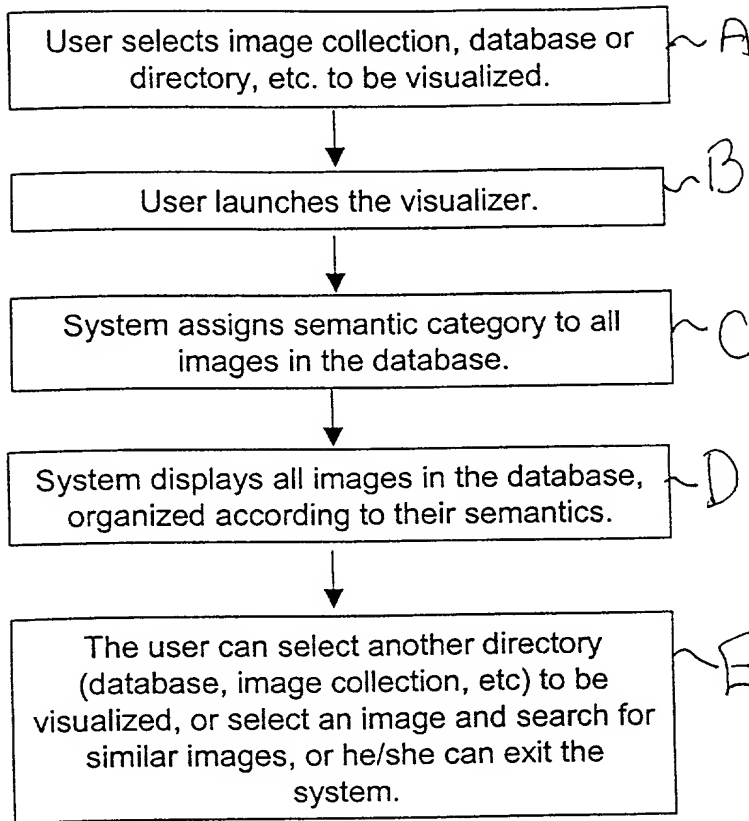
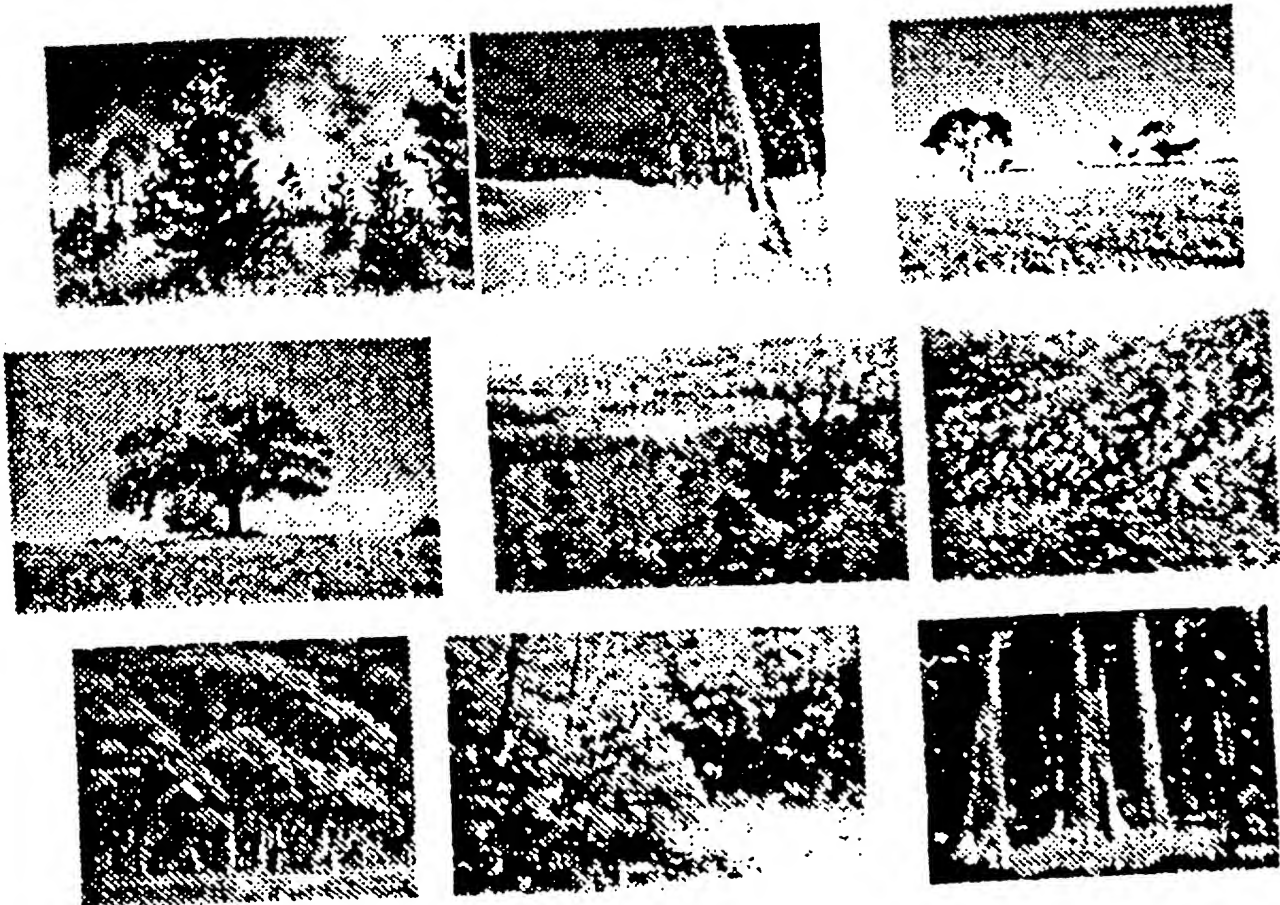


FIG. 8



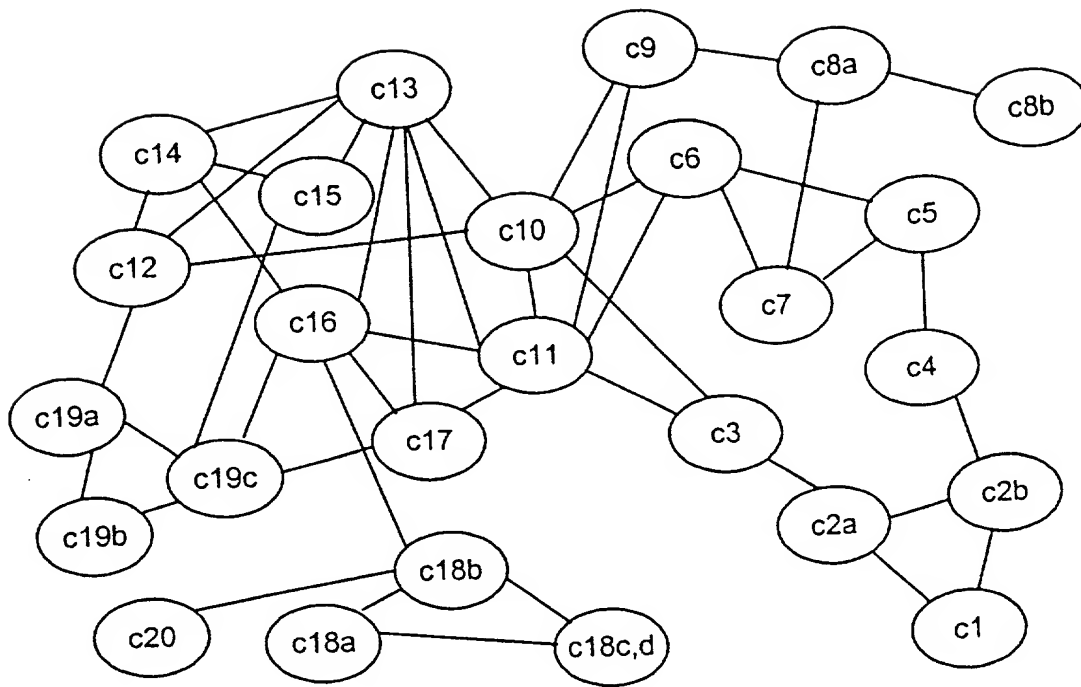


FIG. 9